The Dust and Gas Around beta Pictoris

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We have obtained Spitzer IRS 5.5 - 35 micron spectroscopy of the debris disk around beta Pictoris. In addition to the 10 micron silicate emission feature originally observed from the ground, we for the first time also detect the silicate emission bands at longer wavelengths. The IRS dust emission spectrum is well reproduced by a dust model consisting of fluffy cometary and crystalline olivine aggregates, with an additional population of warm dust to account for the emission at lambda < 15 micron. We searched for line emission from molecular hydrogen and atomic S I, Fe II, and Si II gas but detected none. We place a 3 sigma upper limit of < 17 earth masses on the molecular hydrogen S(1) gas mass, assuming an excitation temperature of Tex= 100 K, suggesting that there is less gas in this system than is required to form the envelope of Jupiter. We hypothesize that the atomic Na I gas observed in Keplerian rotation around beta Pictoris may be produced by photon-stimulated desorption from circumstellar dust grains.